coordinated and complete system of education have long urged the need for action on the part of the State if this nation is, in the coming keen competition for the markets of the world, not to be outclassed by nations which have organised their educational forces.

It may be hoped that this great question will be approached in the spirit of Lord Haldane's remarks, and that our legislators will unite in building up a complete national system of education suited to modern needs.

In the course of his address Lord Haldane said:—

In what I am going to say I am not speaking casually, or with any light sense of responsibility, but, after consulting with the Prime Minister and the Chancellor of the Exchequer and Mr. Pease, we have decided that this question is the next and the most urgent of the great social problems we have to take up. Of course, it is education. The state of education in this country—elementary, secondary, and higher—is chaotic, and my colleagues and I feel that the time has come when a step forward must be taken and on no small scale. As a second message, Mr. Lloyd George sends word that his heart is in this question just as it is in insurance, and that he is ready to throw himself into it with the whole-heartedness with which he threw himself into the insurance question. After consultation that is what we think. As a nation England has never been sufficiently interested in education to stir up its leaders about it. That arises partly from the fact that the leaders themselves have not thrown themselves into the education question sufficiently to stir up the nation. Now is the time for the leaders to make an effort, and that is what the Prime Minister and the Chancellor of the Exchequer think. How is it to be done? Education, if it is to be interesting, must be an appeal to the spirit. It must be an endeavour to raise the level intellectually and morally of the coming generation, upon whose superiority the country will depend in the days to come to meet growing competition. It is worth while making a sacrifice to bring about that result. I do not want you to be under any illusion. It is a tremendous question which we have before us. It is a costly question, too, but I will point out that the expenditure is productive expenditure.

In looking at the balance-sheet in the matter we must not look only at the debit items. If the nation is educated as it should be, the charge for old-age pensions will be smaller than it is now, because there will be fewer people left with less than 13*l.* a year. Income tax will yield more, because more people will be over the income tax limit. The taxes will yield more because the production of the country will be greater. Education means increased power of production. Then the bill on what I may call the negative side of the account will be smaller. Smaller payments will be necessary on account of crime and drunkenness. All social shortcomings will be less among better educated people. We must keep up the capacity of this country to lead in the production of the world. The cost of education on a great scale, even though it involves a great sacrifice, is a sacrifice well made.

We intend to try to make education an interesting subject. I wish that we had Matthew Arnold again among us, writing as he wrote thirty-five years ago. One thing is quite certain—what is about to be done for the coming generation must not be done at the expense of the ratepayer. In Scotland there is a university to one and a half millions of the population; in England a university to three and a half millions. Some remedy for that must surely be found.

A national system of education must be not merely elementary, secondary, or university, but it must be one entire whole, and it must start from this—the child must be made fit to receive the education. A great step forward in that direction has already been made. Then we must remember that though we are making provision by which children may have chances of becoming university students, the bulk of them will not get beyond the elementary school, and full provision must be made for them to do the best that they can within their limits. We must do something substantial in the way of making the teacher's profession more popular.

I am not speaking in the air on this question. We have been busy with the experts for some time, and I should not have ventured to speak as I have done if we did not see pretty clearly the path along which we are going. When we come to work out these things comprehensively it is marvellous how difficulties disappear. I see no reason to despair of our accomplishing rapidly such a reform in our educational system as should put us at least on a level with any other nation in the world.

NOTES.

THE scientific world has lost one of its veterans by the death of Louis Paul Cailletet in Paris on January 5. Born in 1832, at Chatillon-sur-Seine, he studied at the School of Mines and the Faculty of Sciences at Paris. His first work was in metallurgy, and he made many scientific investigations into the principles of cementation and puddling. Later work on the theory of smelting led him to investigate the properties of gases under pressure. As a result of an admirable series of researches he was able to announce in 1877 that he had liquefied oxygen by cooling produced by sudden release from considerable pressure. The same result was obtained by Pictet at Geneva in the same year by a different method, and quite independently. Later investigations enabled all the so-called permanent gases to be liquefied with the exception of hydrogen, which was left for Wroblewsky, who had been his pupil, and much of the later work of Amagat, Dewar, Kamerlingh Onnes, Linde, and Claude was the direct result of his methods and discoveries. In conjunction with Mathias, investigations on vapour pressures and critical volumes led to the discovery of the law of the rectilinear diameter, which has had such fruitful results. Always devoted to scientific work, he became much interested in aviation, acting for many years as the president of the Aero Club of France. The Academy of Sciences elected him a corresponding member in 1877, and gave him the Jecker prize and elected him an academician in 1884. In 1910, on the occasion of his academic jubilee, he was proclaimed the father of modern cryogenics.

ZOOLOGISTS and naturalists interested in the big game of East Africa, and sportsmen wanting to know something of the country, of the methods of transport and of the paraphernalia for a hunting trip, will not regret spending a couple of hours at the Holborn Empire, where some of the results of Mr. P. J. Rainey's recent photographic studies of wild animals are being shown by the Jungle Film Company of

America. The exhibition consists of a series of moving pictures, the sequence of which, to relieve the eyes of the audience, is periodically interrupted by a show of ordinary slides, the whole depicting various incidents and adventures that happened during the trip. The best and most interesting pictures were taken behind an artificial screen at a water-hole, which was visited by elephants, giraffes, zebras, oryxes, baboons, and other species, the scene being enlivened by a fight between two rhinoceroses and by the sensational death of one of them, which charged the photographer in a disconcerting manner. The main object of the expedition was, however, to trap and photograph, not to kill. One of the scenes depicting the struggles of a trapped hyæna is perhaps needlessly prolonged, not to say painful, and the attempt of the expositor to rob the creature of the well-deserved sympathy of the audience by abusing him as a scavenger and body-snatcher will appeal only to the childish-minded, and it will, of course, be well known to English sportsmen that the idea of hunting lions with dogs, which is claimed as a novel feature of the trip, was regularly practised more than half a century ago by that intrepid sportsman Gordon Cumming.

JOHN NAPIER of Merchiston made the first public announcement of his invention of logarithms in 1614, and an English translation of his work was issued two years later, that is, one year before his death. Announcement having been made of a proposal to celebrate the tercentenary of Napier's discovery next year, it may be of interest to state the position of the matter. The Royal Society of Edinburgh has invited the cooperation of other scientific and educational bodies in arranging for this celebration, and the great majority of these institutions and corporations have nominated representatives upon the general committee, which will be convened at an early date to consider the whole question. Among the bodies which were invited by the Royal Society of Edinburgh to cooperate were the Edinburgh Town Council, the universities and technical colleges of Scotland, the Faculty of Actuaries, the Merchant Company, the Heriot Trust, the Edinburgh Committee for the Training of Teachers, the Chamber of Commerce, Merchiston Castle School, and the like. The only societies outside Scotland which were asked to send representatives to the general committee were the Royal Society of London and the Royal Astronomical Society, these being respectively included because of their national importance as the highest representatives of science in our country and of that particular science of astronomy which was the first to benefit by Napier's great invention. We understand that nothing has yet been decided as to the character of the celebration; a congress of calculators and an exhibition of all kinds of aids to calculation in the form of tables or instruments have been mentioned; but no scheme can be definitely adopted until the general committee has met.

WE are informed that Vittorio Emanuele III., King of Italy, has consented to the use of the prefix "Royal" by the Italian Geographical Society.

SIR RICKMAN GODLEE, president of the Royal College of Surgeons, will deliver the Hunterian oration in the theatre of the college on Friday, February 14, at four o'clock.

THE death is announced, at eighty years of age, of Dr. W. H. Dickinson, past-president of the Royal Medical and Chirurgical Society and of the Pathological Society, and at different times Croonian, Lumleian, and Harveian lecturer, as well as censor, of the Royal College of Physicians.

THE Geological Society of London will this year award its medals and funds as follows:—Wollaston medal, Rev. Osmond Fisher; Murchison medal, Mr. G. Barrow; Lyell fund, Mr. S. S. Buckman; Bigsby medal, Sir Thomas Henry Holland, K.C.I.E., F.R.S.; Wollaston fund, Mr. W. W. King; Murchison fund, Mr. E. E. L. Dixon; Lyell fund, Mr. Llewellyn Treacher; Barlow-Jameson fund, Mr. J. B. Scrivenor and Mr. Bernard Smith.

PROF. GUIDO CORA informs us that the fall of a house in Rome on January 8 was clearly registered at the Collegio Romano Observatory by an Agamennone seismograph at 4.26 a.m. The first earth movement came from the north-east, corresponding to the position of the Via del Tritone, where the fall occurred, by which fifteen people were killed, and afterwards the ground continued to vibrate for twenty minutes.

LIEUT. FILCHNER, the leader of the German Antarctic expedition, returned from the south to Buenos Aires on January 7. He has apparently crossed an ice-belt of great width (1200 nautical miles), and discovered, last February, a new land in 76° 35′ S., 30° W., extending to 78° or 79° S., to which the name of King Luitpold has been given. Its boundaries and extent are by no means clearly defined in reports to hand. Lieut. Filchner declares himself satisfied with the results, but the expedition has returned earlier than was expected, and he expresses the hope that work will be carried on. There is later to hand a report of dissension between the members of the nautical and scientific staffs of the expedition, which, it is to be hoped, may not have prejudiced the work.

GERMAN geographers and their colleagues elsewhere are concerned over rumours of disaster to the German expedition in Spitsbergen. The ship has been abandoned in the north at Treurenberg Bay, and though it may be salved in the summer, it is by no means certain that the crew and staff, or some of their members, are not lost or in extremity, for the leader, Lieut. Schroder-Stranz, was away on a sledging journey from which he had not returned. Captain Ritschel, with infinite difficulty and much suffering, has made his way to Advent Bay, and a relief expedition has been organised. The original party was not apparently prepared to winter in the field.

CAPTAIN EINAR MIKKELSEN's account of his expedition to north-east Greenland, presented at the meeting of the Royal Geographical Society on January 13, sounded like a chapter of accidents successfully overcome. At the very first, in the summer of 1909, he was delayed with trouble over his dogs, and those he obtained appear to have done him but poor service. Much additional labour devolved upon himself and his companion, Iversen, who made the journey to Danmarks Fjord, and they had to struggle as well against privation, and, from time to time, sickness. They were in large measure dependent on caches of provisions, the contents of which might or might not prove sufficient for their needs, and on obtaining game, the appearance of which was problematical. Captain Mikkelsen outlined his discoveries relating to the important work of the Mylius Erichsen expedition, as it was his main object to recover the records of the lost leader and his companions, Bronlund and Hoeg-Hagen. He was successful, and referred to the serious import to his own plans of the report left by Erichsen of the non-existence of the Peary channel. This channel Mikkelsen had intended to follow to the north-west coast. By his experiences of boat-work among the ice, and of journeying over the sea and inland ice, and coastwise, Mikkelsen has added comprehensively to our knowledge of the conditions of travelling in Greenland.

M. A. PRAZMOWSKI contributes a second study on the nitrifying organisms of the group Azotobacter in the *Bull. Internat. de l'Acad. des Sciences de Cracovie* (No. 7B, July, 1912). Azotobacter is a true Schizomycete, though it has affinities both with the protozoa and with the unicellular algæ. Its pre-eminent function is to fix nitrogen, and it is probable that it can obtain nitrogen either from nitrogenous compounds or from the free nitrogen of the atmosphere.

MALARIA is prevalent in the Andaman Islands, Bay of Bengal, and a valuable report on the subject has been furnished by Major Christophers (Scientific Memoirs of the Government of India, No. 56, 1912). The chief carrier in the settlements is the anopheline mosquito *Nyssomyzomyia ludlowi*, a species which breeds in and about salt swamps, and was not found at a greater distance from salt or brackish water than half a mile. It was proved to carry the malignant tertian parasite, and it is quite probable that it carries all forms of the malaria parasite.

DR. WIELOWIEJSKI has directed our attention to an article by Prof. Hofer in the *Osterreich. Fischerei Zeitung* (No. 21, 1912) on the biological purification of sewage effluents, &c., by means of fish. Tanks have to be provided, in extent at the rate of one hectare (2·5 acres nearly) per 2000–3000 persons. They work well even in winter, when covered with ice, and are quite equal in efficiency to irrigation in sewage farms, and financially the return is better than from sewage farms, as 500 kilograms of fish (carp) are reared per hectare (in what time is not stated).

IN spite of the enormous and rapidly increasing output of zoological literature at the present time, it is surprising what a large number of well-known types, constantly studied by students in the laboratory, remain inadequately described. A good general account of the morphology of such forms is always valuable, even if it be restricted to some particular system of organs, and we welcome the appearance in the *Zeitschrift für wissenschaftliche Zoologie* of two monographs of this kind. The description by Rudolf Hillig of the nervous sytem of *Sepia officinalis* (*op. cit.*, vol. ci., part 4) is a detailed and admirably illustrated piece of work, which cannot fail to be widely useful, though we fear that but few students will be able to find time to follow it out in all its intricacies. The same remarks apply with equal force to the more comprehensive account by Erich Reupsch of the anatomy and histology of the common Heteropod, *Pterotrachea coronata* (*op. cit.*, vol. cii., part 2).

Two notable monographs on the invertebrate fauna of Japan have recently been published in the Journal of the College of Science, Imperial University of Tokyo. The first (vol. xxx., art. 2) is on "The Errantiate Polychæta of Japan," by A. Izuka, and contains a systematic account of the group illustrated by twenty-four plates. The term "errantiate," instead of "errant," strikes us as being somewhat peculiar, and we do not remember to have seen it before. The second (vol. xxix., art. 2) is a posthumous work on the actinopodous Holothurioidea, by the late Prof. K. Mitsukuri, whose death was such a grievous loss to zoological science. This work has been edited by Prof. I. Ijima and Mr. H. Ohshima, and is illustrated by admirable text-figures of the calcareous skeletal elements and plates of external form. The coloured illustrations, drawn from life, are very beautiful, and for quaintness of form and colour it would be difficult to find any invertebrate to surpass *Enypniastes eximia*.

OBSERVATIONS made on Long Island at the beginning of June, 1911, have enabled Dr. L. Hussahof, in *The American Naturalist* for December, 1912, to obtain new information with regard to the breeding habits of the sea-lamprey (*Petromyzon marinus*). It has been considered that fertilisation in these lampreys is internal—a supposition which may be explained by the fact that the eggs can develop parthenogetically, but in ordinary cases normal fertilisation takes place. Both this formation and spawning occur in a kind of nest made in the bed of a stream by carrying away stones in the circular sucking mouth until a basin-shaped depression is formed, on the bottom of which sand accumulates. Like eels, lampreys never return to the sea after spawning. Death appears to be mainly due "to the cycle of metabolic processes initiated on the maturing of the gonadial products"; but this may be aided by reduced vitality due to the labour of removing stones from the nest, and also by the development of "fungus" in the self-inflicted wounds made during the breeding season.

THE determination of the magnitude of the experimental error in agricultural field trials has recently attracted considerable attention in this country, and has now been investigated in the United States by Prof. Lyttleton Lyon, of Cornell. The results are published in the Proceedings of the American Society of Agronomy, and afford interesting confirmation of those obtained at Rothamsted and at Cambridge.

MESSRS. LAUDER AND FAGAN have issued in bulletin form (Report 26, Edinburgh and East of Scotland Agricultural College) a summary of their investigations on the effect of heavy root feeding on the milk of cows. They show that the feeding of a ration containing a large quantity of water does not reduce the percentage of fat or increase the percentage of water in the milk. A more concentrated ration certainly yields a larger quantity of milk, but the turnip ration, on the other hand, gave richer milk and at a lower cost.

AN account has been published from the Entomological Laboratories of the Agricultural Research Institute, Pusa, of the Tetriginæ (Acridiinæ), by Dr. J. L. Hancock. The members of this subfamily are so variable in structure and coloration that difficulty is experienced in drawing specific distinctions between some of the closely allied forms. The author has carried out a systematic arrangement of the species, and has succeeded in dividing the members of this genus into two groups by the characters of the frontal costa and the position of the superior paired ocelli.

THE existence of circular currents in the Sea of Japan, we learn from *The Japan Chronicle*, Kobe, of December 19, 1912, has been established by Dr. Wada, the meteorologist of the Korean Government-General. Great weight is attached to the discovery by Japanese authorities, who regard it as having an important bearing on the distribution of marine life and even on human migrations in East Asia. Dr. Wada carefully studied the movements of nearly 400 mines, laid in Vladivostok Bay by the Russians and Japanese during the war, which drifted on to the coasts of Japan, and further observed the drift of 120 bottles thrown into the Sea of Japan from a steamer belonging to the Government. From the data obtained, Dr. Wada concludes that the Liman current, running down from the Siberian coast, flows southward past Kang-won and Ham-gyong Provinces, Korea; from Cape Duroch the stream sweeps round to the coast of Echizen, Japan, whence it goes northward along the coast of Japan together with the Tsushima current. One stream goes out into the Pacific through the Tsugaru Strait, and another stream continues northward to Tartar Strait, where it rejoins the Liman current, thus forming a complete circle.

SHORTLY after the great Valparaiso earthquake of August 16, 1906, attention was directed to certain luminous phenomena that were observed before, at the time of, and after the earthquake. The observations have recently been analysed by Count de Montessus de Ballore, the director of the Chilean Seismological Office (*Bollettino* of the Italian Seismological Society, vol. xvi., pp. 77–102). The total number of records collected is 136. Of these 44 are decisively, and 16 implicitly, negative; in 38 cases some lights of an indefinite character were noticed; in the remaining 38 records the observation of luminous phenomena is more or less explicit. Many of the negative records are communicated by persons accustomed to scientific investigations, and in some cases contradict alleged observations of lights at the same places. It does not follow that the lights, when observed, were connected with the earthquake, for, in the centre and south of Chile, a storm raged during the night of the earthquake, and it was from this part of the disturbed area, and not from the epicentral district, that most of the observations came. Count de Montessus therefore concludes that, for the Valparaiso earthquake at any rate, the connection of the luminous phenomena with the earthquake is not proven.

IN *Science* of December 6 Prof. J. E. Church, jun., in charge of Mount Rose Observatory, on the summit of a peak of the Sierra Nevada Mountains (altitude 3292 metres), gives an interesting account of its plans and progress. The meteorological station is at present the highest in the United States, and was established privately a few years ago for the purpose of ascertaining the minimum temperatures at that point; it was subsequently attached to the University of Nevada. Although the staff only occupies the observatory during part of the year, the station is well provided with specially constructed self-recording instruments, and bids fair to become of considerable importance in the study of mountain meteorology. Among the main problems which occupy attention may be mentioned (1) the prediction of frosts at lower levels and the relationship of the former to the passing of storms over the summit. A temperature survey has been in progress for two seasons for the purpose of delimiting areas suitable for fruit-growing, and several auxiliary stations have been established at various levels. (2) The influence of mountains and forests on the conservation of snow. A special bulletin on this subject is now being prepared. Prof. Church points out that "forests may be too dense as well as too thin for the maximum conservation of snow." The ideal forest seems to be one filled with suitable glades, which may be produced by judicious pruning or by proper planting.

UNDER the title, "A Class of Periodic Orbits of Superior Planets," Prof. F. R. Moulton, in a paper reprinted from the Transactions of the American Mathematical Society, xiii., 1, discusses the problem of three bodies of a distant particle moving subject to the attraction of two finite bodies which revolve about the common centre of gravity, with special reference to the case of nearly circular orbits.

IN a note contributed to the *Atti dei Lincei*, xxi., (2), 7, Dr. Giovanni Giorgi considers the solution of problems in elasticity where after-effect (the *Nachwirkung* of Boltzmann) is taken into account. The object is to show that when any problem in statical elasticity has been solved, the corresponding solution in the present instance can be deduced by substituting an expression involving a differential operator for the constant modulus of elasticity.

VARIOUS definitions of a curve have been given by Jordan, Schonflies, Young, Veblen, and others. In the Memoirs of the College of Science and Engineering, of Kyoto, Japan, Mr. Takeo Wada examines these and proposes a new definition of a simple curve, based, like those of Veblen and Young, on the theory of sets of points. It is shown that this definition of a curve is equivalent to that of Jordan, and it appears independent of the dimensions of the space in which the curve exists.

PART 2 of vol. viii. of the Bulletin of the Bureau of Standards contains a complete description of the work done by Messrs. E. B. Rosa, N. E. Dorsey, and J. M. Miller in determining the value of the international ampere, which deposits 1·11800 milligrams of silver in one second, in terms of the absolute ampere, which is one-tenth of a c.g.s. unit of current on the electromagnetic system. The method used is that of the Rayleigh current balance of the single moving-coil type. The balance itself was a 30-cm. beam Rueprecht, from one pan of which the moving coil was suspended between two coaxial fixed coils. The coils were water-cooled so as to minimise convection currents in the air. The ratio of the radii of fixed and moving coils, 50 and 25 cm. respectively, was found by using them as concentric galvanometer coils. The quantity directly measured by the authors was the electromotive force in international volts at the ends of a standard ohm carrying one absolute ampere, but by comparing their result with that of Messrs. Rosa, Vinal, and McDaniel, giving the international volts at the ends of the resistance when an international ampere passed through it, they find that the absolute ampere deposits 1·11804 milligrams as against the international ampere, 1·11800 milligrams, of silver in one second.

THE past year has been notable as regards the smaller electrical apparatus in that great development has taken place in domestic electrical appliances. Both manufacturers and central station engineers have at last awakened to the fact that in order to compete with the gas companies in cooking and other appliances an organised campaign is necessary to bring before the public at large the advantages of the smaller electrical domestic apparatus as produced at the present time. Consequently the engineers of municipal undertakings and supply companies have been working hard to bring the hitherto comparatively unknown domestic electrical appliances before their consumers, and the manufacturers also by improved and simplified heating units have largely contributed to the success of this campaign. The present year should see a reasonably cheap and economical electric oven put on the market to compete with the everyday gas cooker, which at present, on account of its low initial cost, still holds the field against the electric oven among the general public. Several English manufacturers have also during the past year put down extensive plant for the production of small electric motors and fans, the greater part of which up to quite recently were imported from Germany and Italy.

REPRODUCTIONS from photographs of H.M. submarine-boat *E4* appear in both *Engineering* and *The Engineer* for January 10. This boat is of the latest type, constructed by Messrs. Vickers, Ltd., at Barrow-in-Furness, and is of large size and great speed. The surface speed of about sixteen knots is obtained from heavy oil-engines of more than 1500 brake-horse-power. It is understood that the vessel is nearly 180 ft. in length and 23 ft. in beam; the submerged displacement is about 800 tons. A wireless telegraphy mast is fitted, and there is a large rudder at deck level, which improves the steering of the vessel when submerged. It is also stated that the vessel accommodates disappearing guns. When travelling at the surface, *E4* draws about 12 ft. of water. Very little authoritative information has been given regarding vessels of the *E* class, for obvious reasons.

THE fortieth year of publication is reached by the 1913 issue of "Willing's Press Guide." The volume provides an admirable index to the Press of the United Kingdom, and useful lists of the principal Colonial and foreign periodical publications. The journals and proceedings of the various scientific and other learned societies are duly indexed.

THE address on "The Place of Mathematics in Engineering Practice," delivered by Sir William White before the International Congress of Mathematicians at Cambridge last August, and referred to in our report of the proceedings of the congress (September 5, vol. xc., p. 4), has been published in full in our comprehensive contemporary *Scientia* (vol. xii., N. xxvi.-6), the London agents of which are Messrs. Williams and Norgate.

OUR ASTRONOMICAL COLUMN.

THE SUN'S MAGNETIC FIELD.—The question of the sun possessing a magnetic field, similar to the terrestrial magnetic field, is discussed, especially with regard to the phenomena of the sun's upper atmosphere, by M. Deslandres, in No. 27 of the *Comptes rendus* (December 30, 1912). He first discusses the matter theoretically, and, supposing the magnetic field to be produced by the rotation of the sun's electric charge, shows that a solar ion expelled vertically from the sun should be so deviated by the field as to describe a helix having its axis parallel to the field; if many luminous ions are expelled in the form of a prominence the helical motion at the base of the prominence, as seen from the earth, will depend upon the position of the prominence in the solar magnetic field. From a number of observations, M. Deslandres shows that the recorded phenomena are in accordance with the demands of the theory, and he accepts as certain the existence of a general magnetic field about the sun, similar to that of the earth, and in general much more feeble.

THE INTEGRATED SPECTRUM OF THE MILKY WAY.—The Harvard analysis of the spatial distribution of the spectra of more than 32,000 stars indicates that the Sirian type predominates in the Milky Way, and therefore the integrated spectrum of the galaxy should be of the A type. To test this conclusion Dr. Fath has actually secured spectra of certain large areas of the Milky Way, and finds that his results are not exactly confirmatory. With the special spectrograph he used for his work on the zodiacal light, he exposed a plate for a total of 30h. 20m. on the rich region of the Milky Way that is partially bounded by the stars γ, δ, and λ Sagittarii; a second plate was exposed for a total of 65h., and gave better results.